PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of	Docket No: Q56325
Dirk OOMS, et al.	
Appln. No.: 09/422,347	Group Art Unit: 2662
Confirmation No.: 5427	Examiner: Dmitry LEVITAN
Filed: October 21, 1999	

For: DEVICE AND METHOD TO COMPRESS DESTINATION ADDRESSES OF A MULTICAST MESSAGE

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the provisions of 37 C.F.R. § 41.37, Appellant submits the following:

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I. REAL PARTY IN INTEREST

The real party in interest is the assignee, Alcatel.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences

III. STATUS OF CLAIMS

Claims 1-7, 9 and 11-20 are all of the claims pending in this application.

All of claims 1-7, 9 and 11-20 stand rejected under 35 U.S.C. 103 as unpatentable over Boivie (U.S. Patent 6,502,140).

IV. STATUS OF AMENDMENTS

An amendment under 37 CFR 1.116 was filed on October 28, 2005. The amendment was refused entry in the Advisory Action mailed November 15, 2005.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

Multicasting is the transmission of one message to a plurality of different destination hosts. In a "connectionless" multicasting system, each packet must carry a list of all IP addresses of the multicast. The present invention is directed to a method and apparatus for compressing the list of destination IP addresses in a multicast IP packet.

With reference to Fig. 1, a host H1 is to send a multicast to destination hosts D1, D2 and D3. The IP address of D1 is A.B.C.D, the IP address of destination host D2 is A.B.C.E, and the IP address of destination host D3 is A.F.G.H, where each of the letters A-H is an octet. According to the invention, host H1 will detect that the addresses of destination hosts D1 and D2 have a common prefix A.B.C., and restructures these two addresses into a single compound address A.B.C{D,E} where A.B.C is the three-octet common prefix and {D,E} is a list of suffixes that can be concatenated with the common prefix to reconstruct the actual addresses. So in a first iteration of the compression process according to the invention, the three addresses A.B.C.D, A.B.C.E and A.F.G.H are reduced to a compound address A.B.C{D,E} and a normal address A.F.G.H. In a second iteration of the data list compression process, the host H1 now recognizes that the compound and normal addresses share a common prefix A, and that the address can be further reduced to A{B.C{DE},F.G.H}, where A is a common prefix, B.C{D,E} is a similarly compressed representation of the two suffixes B.C.D and B.C.E to be added to the prefix A to obtain the IP addresses A.B.C.D and A.B.C.E, and F.G.H is a single suffix to be added to the prefix A to obtain the last IP address A.F.G.H. Note that the final compressed

version of the IP address list is represented by only 8 octets A, B, C, D, E, F, G and H instead of the 12 octets that the address list would have required if uncompressed.

The above description tracks exactly the language of independent claims 1 and 7.

A feature of the claimed invention to be noted in each of the independent claims is that the resulting compound destination address consists of only compressed final destination addresses. In other words, the resulting compound destination address does not include any intermediate addresses for the routers R1, R2 or R3, but includes only compressed destination addresses of destination hosts D1, D2 and D3.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The sole ground of rejection to be reviewed on appeal is whether or not claims 1-7. 9 and 11-20 are unpatentable over Boivie.

VII. ARGUMENT

Boivie is directed to multicasting, and therefore also deals with multicast headers, but is otherwise not particularly relevant to the present invention and indeed teaches a technique directly contrary to the present invention. As described in the Background section of the present application, connectionless multicasting requires that the packet header contain a list of all destination addresses. In each router, the next hop for each destination in the list is determined by consulting the routing tables. For each distinct next hop, a new IP header is constructed, with the header containing a list of only those addresses for which that next hop is on the shortest path to the destination. The present invention seeks to find a way to compress the destination address list, so that the header need not be so large.

Boivie does not seek to shorten the header at all, but instead puts more information into the header in order to ease the burden on the routers. As discussed at lines 11-46 of column 3, Boivie does not compress the list of addresses but, to the contrary, adds multicast routing information to the header. The advantage of this is described at lines 19-22 of column 2, i.e., the nodes in the network have to store less multicast routing information. One disadvantage of the Boivie technique is described at lines 57- 65 of column 5, i.e., the multicast packets themselves must contain the multicast routing information, but the patentee dismisses this as not a serious problem. But it is exactly the problem with which the present invention is concerned and teaches directly away from the claimed invention.

In the example discussed at column 3 of Boivie, packets are multicast from source host A to destination hosts B, D, E, H and I through routers R1, R2, C and F. The address syntax after compression is B R2 (C (E F (H I) G) D), where each of nodes R2, C and F are not final destination nodes but are instead routers along the way. But there are two very significant distinctions between this address expression and what is disclosed and claimed in the present application. First, in the notation used above and in Boivie, the address of node D is "D", the address of node G is "G", and so forth. Boivie includes the complete address D in the header, the complete address G in the header, and so forth. There is nothing to suggest that if H and I have a portion of their addresses in common, the two addresses could be expressed in a format where the common portion was listed once and the parts of each address that were not common could be listed in a "concatenation list". The practical ramification of this would be, for example, that if the final destinations were B, D, E, G, H and I, and if each address were four octets, the expression of those six addresses would require 24 octets. The present invention would seek to shorten that by trying to find one or more successive common prefixes. Boivie, on the other hand, would list the addresses B, D, E, G, H and I, in full.

Second, while the present invention is directed to a technique for decreasing the list in the header, Boivie et al make the header longer by adding addresses for nodes R2, C and F. Thus, Boivie is now up to at least 36 octets of address information (assuming four octets per address), where the present invention would have less than 24 octets.

In his remarks in paragraph 2 of the Office action mailed , the examiner refers to R1R2 as a common prefix for addresses R1R2C and R1R2D. But R1R2 is not a part of the address of C,

but instead R1 and R2 are addresses of different nodes on the route to C and D. Thus, what Boivie is doing in its "folding" method at lines 30-58 of column 4 is using a successive factoring process to compress the routing information, but not to compress the destination addresses. Boivie is compressing information that the headers of the present invention do not even include.

Independent claims 1 and 7 both recite compression of final destination addresses where each final destination address represents a different final destination host. These claims then describe the separation of the addresses into common prefix and suffixes, and then the adding of these together to form a compound destination address. Boivie does not parse and combine final destination addresses, but is instead working with routing information. Further, each of these claims recites that the compound destination address consists of compressed final destination addresses, whereas Boivie includes not only the final destination addresses but also includes the addresses of intermediate nodes. Thus, the independent claims all distinguish over Boivie.

Claim 2 specifies that the addresses being compressed are IP addresses, whereas Boivie is not compressing IP addresses but is compressing routing information.

In the final Office action mailed September 9, 2005, the examiner argues that the difference between Boivie and the present invention is simply in the type of addressing used, and that it would have been obvious to use the technique of Boivie with an addressing type which did not include intermediate node addresses. But this appears to be an effort at hindsight rationalization of the proposed change. Boivie and the present invention do not use different address types. They both use IP addresses. What Boivie has done is to add routing information

to the header that was formerly stored in the routers. And Boivie then uses a compression technique to minimize the extra burden of carrying the additional information. If the additional header information were eliminated, there would be nothing to compress as far as Boivie is concerned. Modifying Boivie by eliminating the intermediate node information would obviate the entire purpose of Boivie's invention. These is certainly nothing in Boivie to suggest such a modification, much less to follow that up by adapting the Boivie compression idea to a header that no longer even includes the information Boivie sought to compress,

For the above reasons, it is submitted that the invention defined in the appealed claims would not have been obvious to one of skill in the art, and reversal of the examiner is requested.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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CLAIMS APPENDIX

CLAIMS 1-7, 9 and 11-20 ON APPEAL:

1. A device for compressing a list of final destination addresses for a multicast message, wherein each final destination address in said list represents a different final destination host, said device comprising:

a detector that detects a common prefix in at least two different final destination addresses from said list of final destination addresses,

a generator that generates a suffix list for final destination addresses from said list of final destination addresses that are detected to have a common prefix, wherein said suffix list represents the non-identical portions of said final destination addresses detected to have a common prefix, and

an adder that adds said suffix list to said common prefix to create a compound destination address consisting of compressed final destination addresses.

2. The device for compressing according to claim 1, wherein said list of destination addresses comprises Internet Protocol addresses.

3. The device for compressing according to claim 1, wherein said list of destination addresses comprises Internet Protocol addresses and other compound destination addresses.

4. The device for compressing according to claim 1, wherein said list of destination addresses comprises previously compressed compound destination addresses.

5. The device for compressing according to claim 1, wherein said device is incorporated in a host of a communications network having connectionless multicast transmission capabilities.

6. The device for compressing according to claim 1, wherein said device is incorporated in a router of a communications network having connectionless multicast forwarding capabilities.

7. A method for compressing a list of final destination addresses for a multicast message, wherein each final destination address in said list represents a different final destination host, said method comprises:

detecting a common prefix in at least two different final destination addresses from said list of final destination addresses,

generating a suffix list for final destination addresses from said list of final destination addresses that are detected to have a common prefix, wherein said suffix list represents the non-identical portions of said final destination addresses detected to have a common prefix, and

adding said suffix list to said common prefix to create a compound destination address consisting of compressed final destination addresses.

8. (*Cancelled*).

9. A router according to claim 6, wherein said router further comprises:

a routing table memory, and

an addressing device to address said routing table memory via a compound address having the same format as said compound destination address.

10. (*Cancelled*).

11. The device for compressing according to claim 1, wherein said detector detects octet-aligned prefixes.

12. The device for compressing according to claim 1, wherein said detector detects nibble-aligned prefixes.

13. The device for compressing according to claim 1, wherein said detector detects bit-aligned prefixes.

14. The method for compressing according to claim 7, wherein detecting a common prefix further comprises detecting octet-aligned prefixes.

15. The method for compressing according to claim 7, wherein detecting a common prefix further comprises detecting nibble-aligned prefixes.

16. The method for compressing according to claim 7, wherein detecting a common prefix further comprises detecting bit-aligned prefixes.

17. The device for compressing according to claim 1, wherein said detector, said generator and said adder iteratively compress said list of final destination addresses.

18. The method for compressing according to claim 7, wherein the detection of a common prefix, the generation of a suffix list and the adding of the suffix list to the common prefix is iteratively performed for said list of final destination addresses.

19. A communications network comprising:

a host that generates multicast packets, wherein said host comprises a device for compressing a list of final destination addresses according to claim 1; and

a router connected to said host, wherein said router receives a compound destination address created by said host and derives the common prefixes from said compound destination address to determine the next hop for each common prefix.

20. The communications network according to claim 19, wherein said router comprises a compression device for compressing a list of derived common prefixes and their respective suffixes, said device comprising:

a generator that generates a suffix list that represents non-identical portions for each of said common prefixes derived from said received compound destination address, and

an adder that adds said respective suffix list to each of said derived common prefixes to create a new compound destination address consisting of compressed final destination addresses.

EVIDENCE APPENDIX:

Appellants have not submitted any evidence pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132, nor is there any other evidence entered by the Examiner and relied upon by Appellant in the appeal.

RELATED PROCEEDINGS APPENDIX

There are no decisions rendered by a court or the Board in any proceeding identified above in Section II pursuant to 37 C.F.R. § 41.37(c)(1)(ii).